IN THE SPECIFICATION

Please replace the paragraph on page 22, entitled "**ABSTRACT OF THE DISCLOSURE**" with the following paragraph:

ABSTRACT OF THE DISCLOSURE

~~This invention generally relates to~~ a Apparatus and methods for recording and projecting images on curved screens in a manner that imparts to an audience a sense of immersion in the projected scene. The screen is usually a segment of a spherical dome, with a large portion of the segment located below the horizontal viewing line of an audience. During recording of the images, the camera lens longitudinal axis is maintained in a substantially horizontal orientation. During projection, the projector lens longitudinal axis is maintained in a substantially horizontal orientation, and the image is positioned on the screen by horizontal and/or vertical movement of the projector lens relative to the film. The image is projected to appear to the viewer to be in substantially the same position as it was to the camera lens during recording.

Please replace paragraph **[0012]** with the following paragraph:

[0012] Fig. 1 is an elevation side view of depicting the relative positions of the projection surface, projector and viewers.

Fig. 2 is a plan view of the main elements in Fig. 1.

Fig. 3 is an elevation view of a prior art IMAX theater.

Fig. 4 is a perspective view depiction of a horizon line projected by a tilted projector.

Fig. 5 is a perspective view depiction of a horizon line projected by a horizontal projector with an offset lens.

Fig. 6 is a perspective view depicting the effect of offsetting a projector lens relative to the film.

Fig. 6a is a perspective view depicting a recording camera system.

Fig. 7 is a side view of a lens system and refracted light rays.

Fig. 8 is a side view of an alternative embodiment depicting the relative positions of the projection surface, projector and viewers.

Fig. 9 is a top view of the alternative embodiment of Fig. 8.

Fig. 10 is a side view of another alternative embodiment depicting the relative positions of the projection surface, projector and viewers.

Fig. 11 is a top view of the alternative embodiment of Fig. 10.

Fig. 12 is a side view of a dome shaped projection surface.

Fig. 13 is a top view of a dome shaped projection surface.

Fig. 14 is a rear elevation view of a dome shaped projection surface.

Fig. 15A is a plan view depicting the overlapping of projection surface panels.

Fig. 15B is a cross section taken along line 15B from Fig. 15A.

Fig. 16 is a side view of a dome shaped projection surface depicting the overlapping of projection surface panels.

Fig. 17 is a top view of a prior art dome shaped projection surface depicting the overlapping of projection surface panels.

Please replace paragraph **[0015]** with the following paragraph.

[0015] In the preferred embodiment, a projector 28 is positioned generally above the viewers 10. The projector has a lens system 32, which will be discussed below. The angle of the projector lens relative to screen and the position of the audience must be considered in determining the position of the projector. The optimum optical position for the projector lens is at the center 30 of the spherically curved projection screen 12. However, this may not be preferred because of possible interference with the audience seating layout chosen for the venue. In the preferred embodiment, the projector and its lens system 32 is moved approximately 9 feet above center 30 to allow for three rows of viewers 10 underneath. With the projector 28 and the lens 32 above the screen center 30, the image will correspondingly be raised above the centerline 34. In Fig. 1, this is depicted as projection reference 36, also referred to as the centerline of projection. Therefore, in order for a viewer 10 to feel as though he or she is in the same position as the recording lens 84 of the camera 80 relative to the captured scene 90, the image must then be moved lower to compensate for the raising of the projector. This could be accomplished by tilting the projector downwardly to project the image downwardly to fill the screen 12 with the picture. However, tilting causes an unrealistic image to be displayed, as shown in Fig. 4. Tilting of projector 28 will cause the horizon 38, as well as other horizontal lines and edges, to appear curved. Lines that are not horizontal will also be affected to varying degrees; for example, lines that should be seen as parallel may appear to diverge, and the resulting images will not appear life like. Thus, in the preferred embodiment, depicted in Fig. 5, the projector 28 is maintained at

an essentially horizontal orientation along both its longitudinal and transverse axes, and the horizon 38 appears properly horizontal, and other lines and edges maintain their proper angular orientations. In order to lower the projected images on the curved projection screen 12, the lens 32 of the projector 28 is lowered relative to the horizontal centerline of the film which is moving through the projector. The lens is maintained in a vertical plane and is not tilted. As discussed above, tilting the lens would distort the image. Offsetting the lens down, below the centerline of projection 36, brings the image down, but the relative angles of the light rays exiting the lens are not effected. Therefore, a horizontal ray will remain horizontal when the lens is offset down, or in any other direction. This method eliminates unwelcome effects caused by tilting. Offsetting the lens 32 in another direction relative to the centerline of projection 36 will offset the projected image in that direction. Of course, instead of film a pixel plane, or other system compatible with computer generated images, may be used to generate images to be projected. In such a case, the lens 32 would be lowered relative to the centerline of the pixel plane or other image generating system.

Please replace paragraph 22 with the following paragraph:

[0022] In the preferred embodiment, the lenses of the camera 80 and projector are matched so that the field of view of the projected image substantially matches the field of view of the recorded image 82, to the extent the projected image is visible on the curved screen. The camera 80 recording the images is maintained in a horizontal position with the camera 80 and camera lens 84 longitudinal axes 86 and transverse axes 88 maintained in a substantially horizontal orientation, and the projector 28 is likewise maintained horizontal. The image is projected onto screen 12 so that the sweet spot of the audience of viewers 10 is located at the position of camera 80 relative to the scene 90 which was recorded. When projected, the combination of the offset of the projector lens and the dimensions and placement of the screen relative to the audience of viewers 10 causes the horizon to appear to the viewer in approximately the same place and at approximately the same angle of view (viewing angle) as the original scene 90 appeared to the front 92 of the lens 84 of the recording camera 80 (scene angle). In the present invention, realism is achieved when the viewer sees on the screen approximately what the camera 80 lens 84 saw during recording, with the horizon and angles of view being essentially the same. As an example, an acceptable projector 28 would be an IMAX brand 15-70 mm 48 fps projector.

Compatible cameras are also available from IMAX Corp. Another example of a camera which could be used is a Wilcam camera built by Geoff Williamson.

Please replace paragraph 26 with the following paragraph:

[0026] The filming system is optimized with the projection system so that post-production image manipulation is reduced to a minimum. The invention involves not only the projection system, but a compatible recording system as well. Just as tilting the projector causes straight lines to appear curved, filming with a tilted camera also causes distortion. As stated above, a goal is to duplicate what the camera 80 lens 84 saw. However, unless the camera is in a proper orientation, the image recorded will not be realistic and the projected image will not convey to a theater viewer the feeling of immersion in a real scene. For example, if the scene is recorded with the camera lens tilted downward, below horizontal, distortion is introduced which will detract from the feeling of immersion in the theater viewer's mind. It will create the impression of tilted horses as discussed above. It is necessary to record a horizon line in a position so that it can be then projected as a straight line at approximately the viewer's eye level, in the case of a horizon at a distance, because that is where an observer in the real world would perceive the horizon to be. If the camera were to shoot the horizon higher or lower than that, the theater viewer would perceive a false perspective. In other words, the procedure is to shoot the film 94 and project it so that the distant horizon line lies approximately in the center of the audience. All the recorded objects then appear to be horizontal and objects with parallel sides in the real world appear to have the same parallel sides when the image is projected into the dome. Of course, when a camera lens/observer is moving toward a large object, such as a mountain, the top of the mountain will appear above the eye level of the camera lens/observer. This relative position of the mountaintop as viewed by the camera lens/observer must be maintained in the projected image as viewed by the theater viewer. As is known to persons ordinarily skilled in the art, all physical scenes include a horizon which, when viewed at a distance, is observed to be at approximately eye level. Sometimes the horizon may be obscured by an object such as a mountain.

Please replace paragraph **[0027]** with the following paragraph:

[0027] In the preferred embodiment, for the camera 80 that records the film 94, a standard IMAX lens was chosen. However, other lenses could be used, such as manufactured by Iwerks,

Nikon or others. For the projector lens, an IMAX lens was also chosen, but options are available from Iwerks, Nikon and others. The projector chosen was an IMAX high-speed projector operating at 48 frames per second, but others could be used, such as available from Iwerks, and could operate at other frame rates. However, the speed of 48 frames per second was chosen because of the picture quality produced. The preferred film is 15 perforation, 70 mm film.